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STORAGE DEVICEField of the Invention

The present invention relates to a device or installation and a method for efficiently storing printed products.

5 Background Art

A well-known problem in the handling of printed products, such as newspapers and supplements to newspapers and the like, is that large numbers are printed in a short time, often more than 20 newspapers/second. There
10 is a great need for efficient and flexible solutions in connection with the handling of the products as they come from the printing machine before they are further distributed. There is also a need for intermediate storage of supplements that are to be inserted in a newspaper, while
15 the actual newspaper is being printed.

Various types of installations and methods are today used in the handling of printed products. In many printing plants, use is made of rolls onto which the printed products are wound as they arrive from the printing
20 machine. Once a roll is full, it is stored while waiting for further handling, and a new roll is arranged to receive the products. This method requires a great deal of manual handling, and because of the exchanges of rolls, the process must be interrupted at regular intervals. The smaller the rolls the more frequently the process
25 must be interrupted, and the larger the rolls, the more complicated the handling. With the rolls stored vertically, the actual rolls often become oval, egg-shaped, after quite a short time. As a result, the products may
30 be bent. The rolls are further intended to be moved from the place where they have been filled with newspapers to a storage space and then back when the products are to be unwound from the rolls. This method makes extensive intermediate handling necessary. Another problem that may

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arise in this type of storing is smearing of printing ink between the printed copies, which means that some newspapers have to be discarded. Furthermore the above process is susceptible to the roll joints which arise in the printing machine when the paper on which the newspaper is being printed has to be exchanged. When a newspaper with a printing joint is rolled up for storage, the entire process may have to be interrupted.

US 4,274,623 discloses an apparatus intended for stacking of printed products. The products are advanced by means of a conveyor belt so as then to be stacked layer by layer by the apparatus rotating about its pivot. The pivot consists of a rod which is vertical relative to the base, which means that a helical "corncob-like" stack is obtained.

US 4,000,806 discloses an apparatus for feeding printed products when they are stacked in a helical stack. The apparatus comprises a pivot around which the products are stacked. The apparatus is further provided with a stationary opening through which the products pass when they are to be discharged from the stack. The stack of products is according to US 4,000,806 adapted to be arranged so that the pivot is vertical relative to the base.

The apparatus according to US 4,000,806 and US 4,274,623 comprise a pivot in the form of a rod around which the products are supplied, layer by layer. A problem with these apparatus is that they may hold a rather small number of products. The stacks are further adapted to be moved from the place of stacking to a storage space and then back when the products are to be discharged from the stacks. This method necessitate extensive intermediate handling.

There is a need for an installation and a method that solve the above problems to be able to render effective and improve the handling of printed products, especially the storing of the same.

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Summary of the Invention

An object of the present invention is to wholly or partly solve the above problems by providing an installation and a method which

- 5 • do not cause smearing of printing ink between the printed copies,
- do not bend the printed products when stored,
- are not susceptible to roll joints,
- do not require intermediate handling,
- 10 • are space-saving,
- ensure a continuous handling process without many interruptions,
- can handle quite large numbers of printed products,
- make the degree of utilisation optimal since a plurali-
- 15 ty of installations can be arranged in a system.

According to the present invention, this object is achieved by an installation and a method for storing printed products in one or more layers, having the features as stated in claims 1 and 5, preferred embodiments

20 being defined by the dependent claims.

According to a first aspect of the invention, there is provided a method of storing printed products in one or more layers on at least one substantially circular conveyor track. This method of placing the products on

25 a circular conveyor track gives the advantage that there will be no movement between the copies, which means, inter alia, a considerable reduction of the risk that smearing of printing ink from one newspaper stains another. A further advantage is that the air is pressed

30 out from the printed products, which means that they are packed properly and that they will not be bent.

According to a second aspect of the present invention, there is provided a method of supplying printed products to the conveyor track at least at one point in

35 the track. The lowermost layer can be discharged from the conveyor track through an opening in the track. Printed products can be supplied to the track while at the same

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time printed products are discharged from the track at the opening. These methods relating to the process of supplying and discharging products to/from the track are independent of each other, which means that the method according to the present invention is flexible and can be adjusted entirely to the user's needs. A further advantage is that an even speed and reliable operation are achieved since just a few interruptions in the handling of the products have to be made.

10 In addition to the above-described methods, the invention also relates to a corresponding installation. According to a third aspect of the invention, there is thus provided an installation for storing one or more layers of printed products, comprising one or more conveyor tracks. Printed products are stored on a substantially circular conveyor track, said track being provided with at least one opening for discharge of the lowermost layer. The conveyor track comprises means which are adapted on the one hand to hold the lowermost layer on the track and, on the other, to guide the lowermost layer away from the track through the opening. Moreover the means, when in a first position, bridges the opening, whereby the conveyor track is continuous. In one embodiment of the invention, the means is a flap which is movably arranged in the opening.

25 The above installation corresponds to the methods according to the first and second aspects of the invention as discussed above, and advantages corresponding to those of the methods are achieved. A further advantage of the installation according to the invention is that it is not susceptible to roll joints, which arise when the paper on which the newspaper is being printed runs out in the printing machine and the roll has to be exchanged. A separate conveyor supplies the newspapers to the track which receives them without difficulties. If gaps arise in the flow of newspapers, for instance because newspapers with roll joints have been sorted out, this causes

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no problem to the installation according to the invention, which continues working all the same.

Furthermore the invention comprises according to a fourth aspect an installation where the track is arranged with at least one edging, which is adapted to hold the printed products on the track. The installation is designed so that the products should stay on the track without the edging, but the advantage of the edging is that it constitutes an extra security function.

According to a fifth aspect of the invention, two or more tracks are arranged in a system. Two or more tracks can be arranged concentrically. At least one or more tracks can be arranged above a first track. The tracks operate independently of each other. The advantage of this is that two or more tracks can be arranged in a system in various ways. A plurality of tracks concentrically, a plurality of tracks above one another, or both concentrically and vertically. The tracks operate independently of each other but can be adjusted to each other, if required. The advantage of this is that a very flexible system is obtained and that the available floor surface is effectively utilised.

In general, the invention gives the advantage that a circular conveyor track can be used to store printed products in an advantageous manner, in respect of efficiency as well as quality of the products. The installation according to the invention can also be arranged in a system of several installations which are independent of each other. This results in a flexible system which can be adjusted to the user's needs and requirements and which can handle and store large numbers of printed products.

Brief Description of the Drawings

Fig. 1 is a top plan view of an installation according to the present invention,

Fig. 2A illustrates a detail of the installation in a first position, in a side view,